matical sections cutting the map north and south at equal distances of twenty-seven hundred metres, showing theoretically for the whole country the subterranean distribution of the beds. In the tertiary formations an equal number of transverse sections will accompany the sheets. In the field-work, each formation will be studied monographically. One of the features of the reports will be the remarks on the subterranean hydrography. The present sheet has been prepared by the director of the survey, Mr. E. Dupont, for the carboniferous, and by Mr. Michel Mourlon for the Famennien or upper Devonian. In the accompanying text are a number of detailed sections printed on thin India paper, colored chromolithographically, and afterwards pasted in their proper place; there is also a small colored sketch-map showing the distribution of the formations in Condroz and Entre-Sambre-et-Meuse. The text is a large octavo of 66 pages.

The geological maps of Dumont have always been cited as models. By publishing the present map, the Belgian government preserves its high position as a leader in geological research. J. B. MARCOU.

LETTERS TO THE EDITOR.

Flight of the flying-fish.

IN 1871 (*Proc. Bost. soc. nat. hist.*, xiv. 137), from observation of the flying-fish in the Central-American and Hawaiian Pacific, I expressed the opinion that their flight was something more than sustaining themselves in the air by a parachute-like membrane. In the Indian ocean, in 1882, they flew from before our steamer in immense numbers; and I had ample opportunity to watch them in smooth and rough seas, and am confirmed in the statement then made, that they have the power of directing their flight. Admitting that, as a general rule, their course in the air is a continuation of their onward and upward passage through the water, and its duration as long as the expanded pectorals are moist enough to permit the rapid vibrations by which they skim along near the surface, I am sure that they can, even without touching the water with their long, lower caudal lobe, turn to the right or left, rise or fall to avoid a wave, and change direction, almost like a bird. I have often seen them sustain a flight of over a minute by my watch, and traverse several hundred yards, apparently half a mile. Their lot seems a hard one. Exposed to porpoises, dolphins, and voracious fishes, in the sea, and to marine birds in the air (happily few in these waters), what appears mere joyous amusement is really a race for life. S. KNEELAND.

Use of wire in sounding.

Since preparing the memorandum on the early use of wire in sounding (SCIENCE No. 3, p. 65), my attention has been called to two other instances of its use It appears that the wire used by Walsh was of steel, though this is not stated in the log-book. And, in addition to the ten-pound sinker, there was a registering apparatus of six pounds' weight, designed by Maury, used on at least one of the casts, according to Capt. Belknap, but not mentioned in the record.

In the same year in which Walsh made his preparations, Capt. Barnett, R.N., of H. M. S. Thunderer, on her way to the Azores from America, sounded, August, 1849, with iron wire and a sixty-one pound sinker. Only one attempt was made, and the wire broke at 2,000 fathoms. It would seem possible, that, while the Thunderer was in America, some communication might have passed between the American and British naval officers which resulted in the attempts of Walsh and Barnett.

However, a still earlier attempt to employ wire was made, which, for the present at least seems to be the earliest instance of its use. This was on the U.S. exploring expedition under Wilkes, when copper wire about three thirty-seconds of an inch in diameter, with twisted and soldered splices, appears to have been furnished to most of the vessels — at whose suggestion I have been unable to discover. The experiments were unsatisfactory, owing to constant parting of the wire; and, before the return of the expedition in 1842, the plan was abandoned. An admirable discussion of this topic, contributed by Capt. George E. Belknap, U.S.N., will be found in Hamersly's Naval encyclopaedia (Philadelphia, 1881).

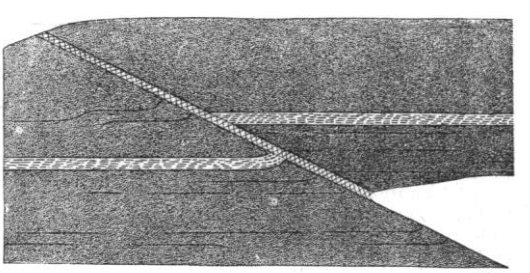
WILLIAM H. DALL.

Peculiar faulting of a coal-bed.

In a drift opening in the Pittsburg (Ohio No. 8) coal, near this place, there is exposed a rather exceptional faulting of that seam.

The fault occurs ninety yards from the mouth of the mine, where about forty feet of strata lie over the coal. The slope of the surface is quite uniform from the opening to the point of fault, whence the rise is more rapid for a short distance, when the surface becomes a level ridge, from which it falls in all directions.

In the accompanying cut of the fault, which is longitudinal in relation to the entry, the horizontal



dotted space represents the 'inbearing vein,' so persistent in the Pittsburg coal. The sloping checkered space represents the pulverized smutty coal on the line of fault, having a slope of about 30°. The bottom coal is very uniform as to thickness, except at the fault, where, from duplication and crushing in a horizontal direction, it is considerably thickened. The condition of the top coal is very different. From the fault to the mouth of the mine it varies from 12 to 20 inches, with a roof of slickensided 'soapstone,' while, immediately beyond the fault, it assumes a very uniform thickness of 30 inches.

On the east or under side of the fault, the edges of the layers of coal and slate partings are undisturbed, even immediately in contact with the crushed line. On the west side the layers and partings are all bent down where they come to the line of fault, as shown in the cut, in which the dark lines in the body of the coal represent slate-partings. Some of the layers of coal are pursed and distorted where they come to the fault. The immediate contact of the fault with the underlying fire-clay is concealed by a tramway. At all other parts of the fault, where it crosses the entry, its character is very plain. The wedge-shaped edge of the upper coal is cut off very abruptly at the line of fault, as prolonged at its normal slope up into the shale. The 'inbearing vein' is about twelve inches